Enterprise InfiniBand on Wall Street

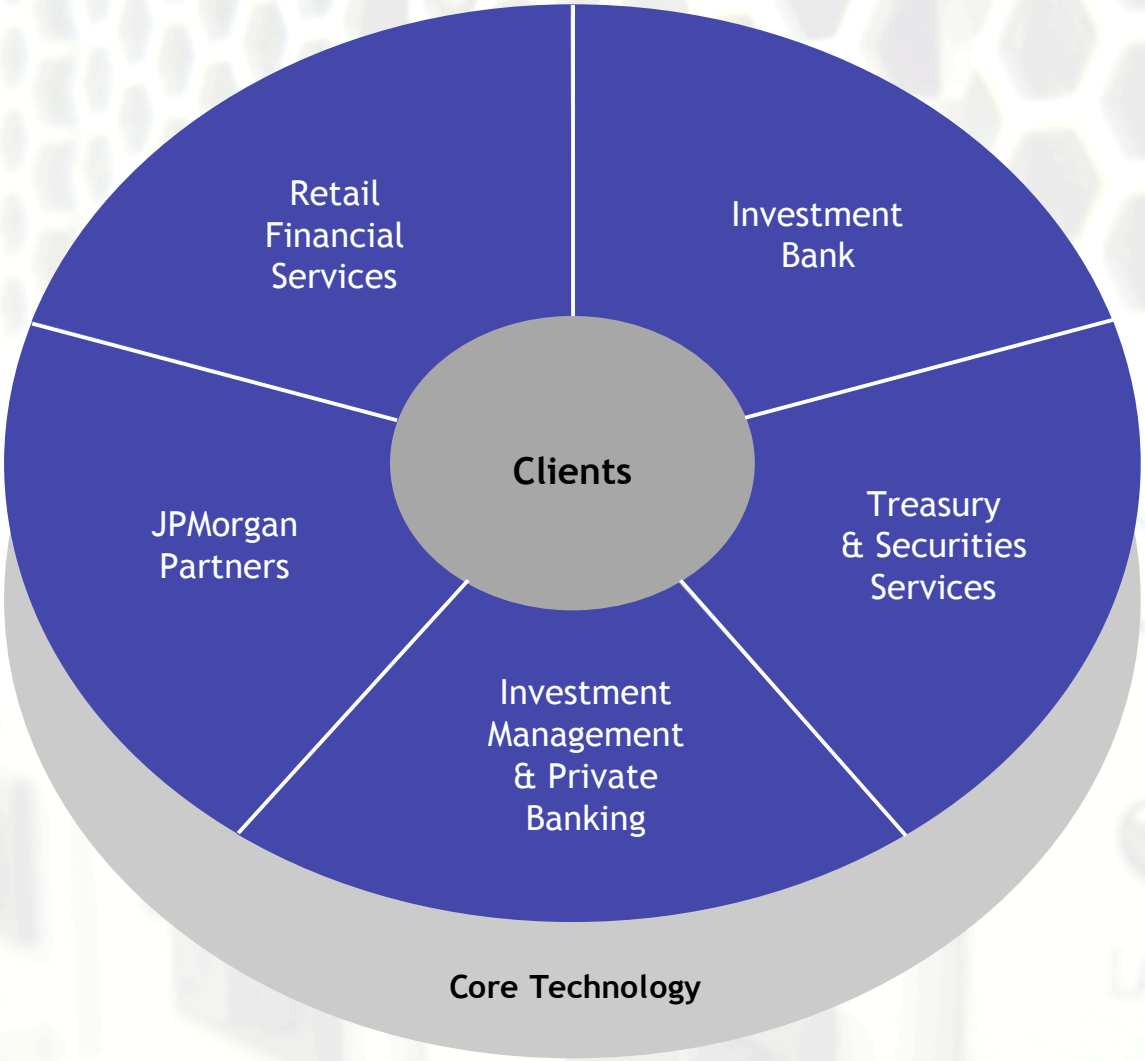
OpenIB.org/Intel Developer Forum 2005

Ty Panagoplos, Program Director, Compute Backbone
Peter Krey, Chief Engineer, Compute Backbone

JPMorgan

ib technology

JPMorganChase Is One of the Largest Financial Institutions



We Spend $7.1B Annually in Technology

The Investment Bank

JP Morgan's Investment Bank is an industry leader offering thousands of clients expert advice and execution in all aspects of capital formation, growth and preservation.

The Investment Bank

Who We Are

- People: 15,000 in IB; 3,000 in IBTech
- Locations: Offices in 50 countries
- Clients: More than 90% of Fortune 1,000
- Revenues: $12 billion

Lines of Business

- Client Coverage
- Credit & Rates Markets
- Institutional Equities
- Global M&A
- Proprietary Positioning
- Treasury

Leadership Positions

- Global Syndicated Loans
- Interest Rate Derivatives
- Asset-Backed Securities
- Investment Grade Corporate Debt
- Emerging Markets International Bonds
- Global Announced M&A

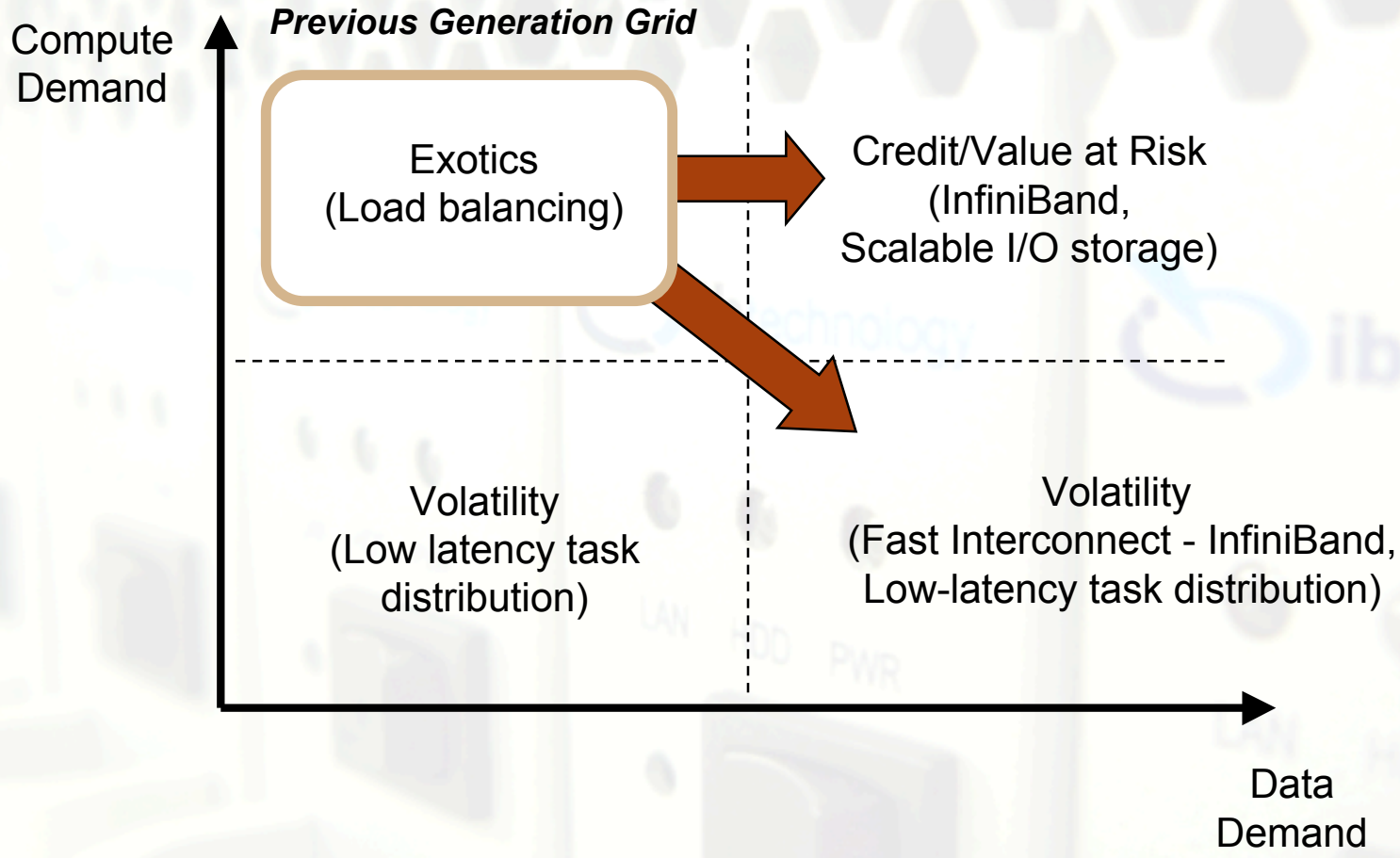
Grid at JPMorgan

- The Grid at JPMorgan, known at the Compute Backbone, is a cross business compute farm consisting of over 5,000 CPUs operating globally (North America, EMEA, and Asia Pacific)

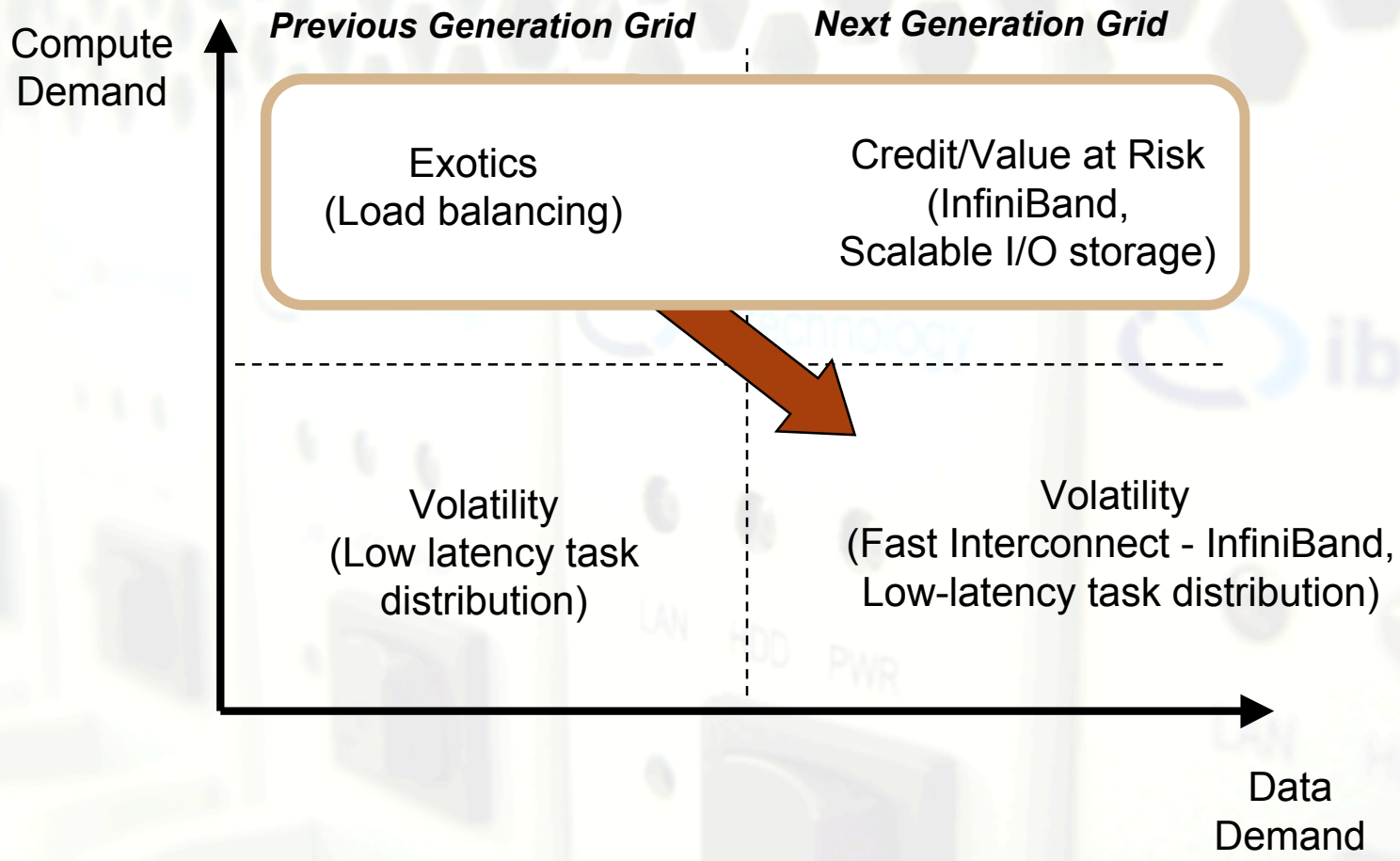
- The Compute Backbone is now running ten mission-critical risk and trading applications 24x7, achieving uptime numbers of 99.999% Across the Board

- JPMorgan is now deploying its next-generation grid products based on InfiniBand.

The Grid Was Targeted at "Short Data, Long Compute"

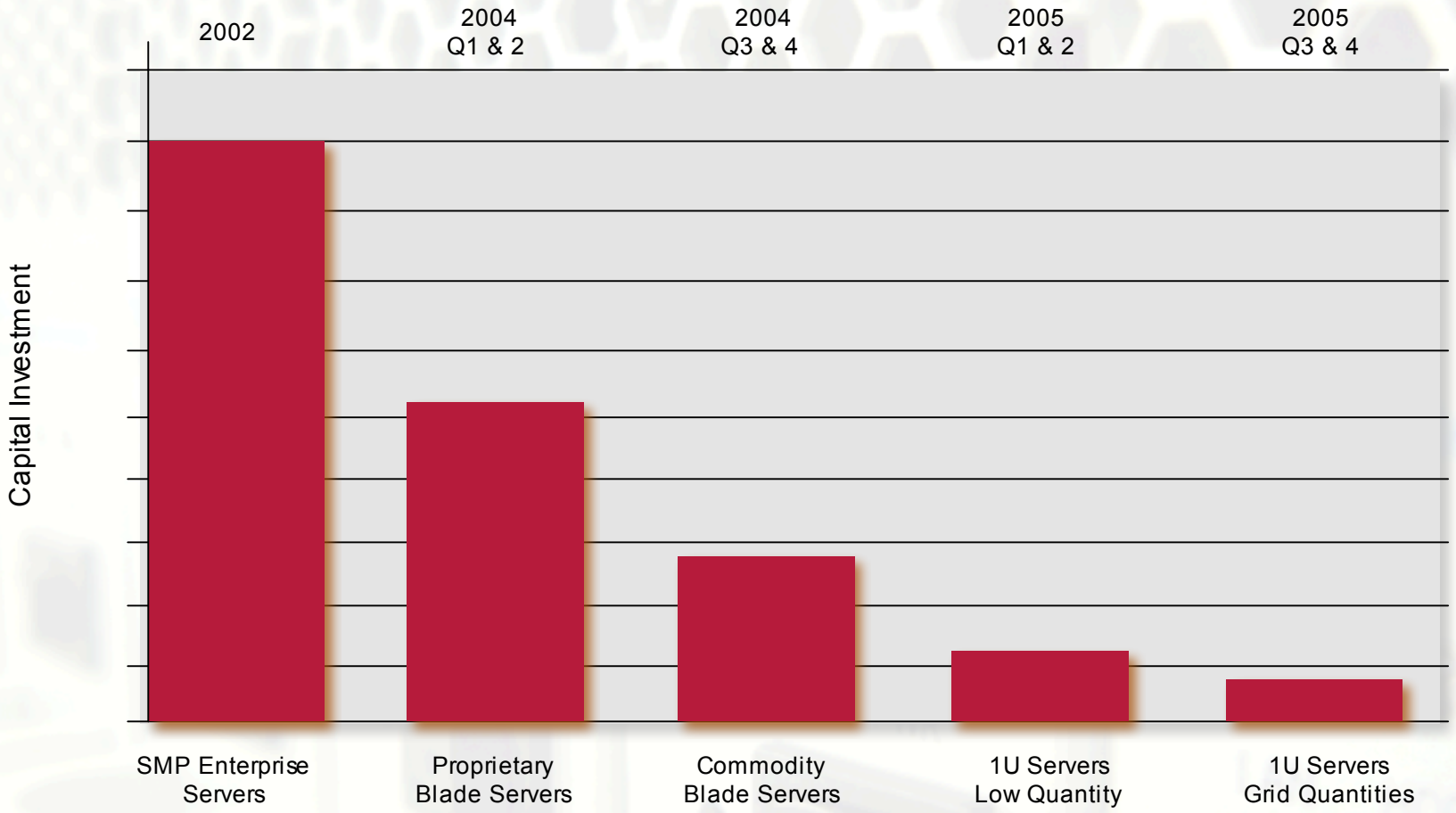


InfiniBand Now Enables Us to Target "Long Data, Long Compute"



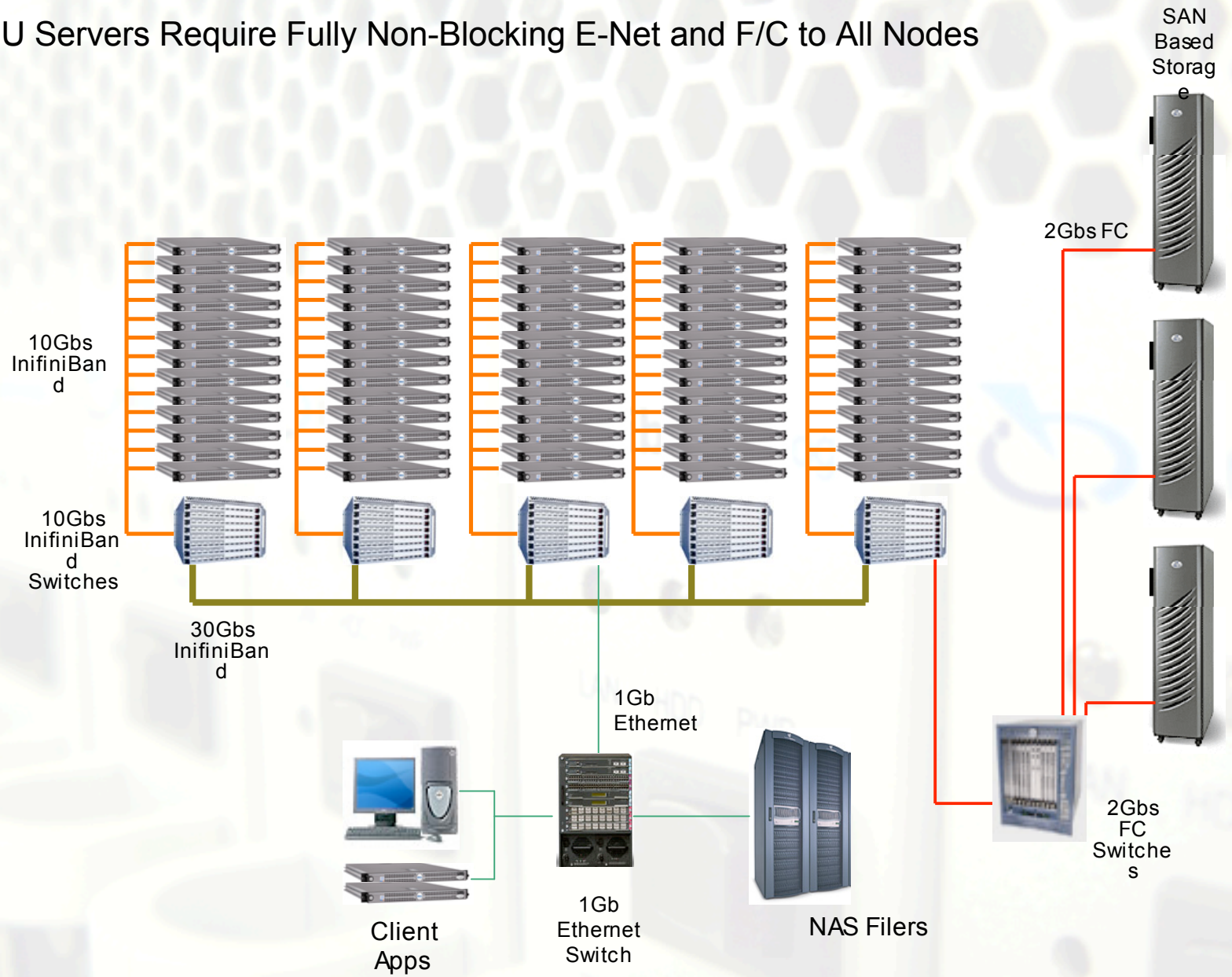
Grid Infrastructure Builds on Commodity Hardware

- Driving Down CPU/Hour Costs From Over $10 Down Below $0.50

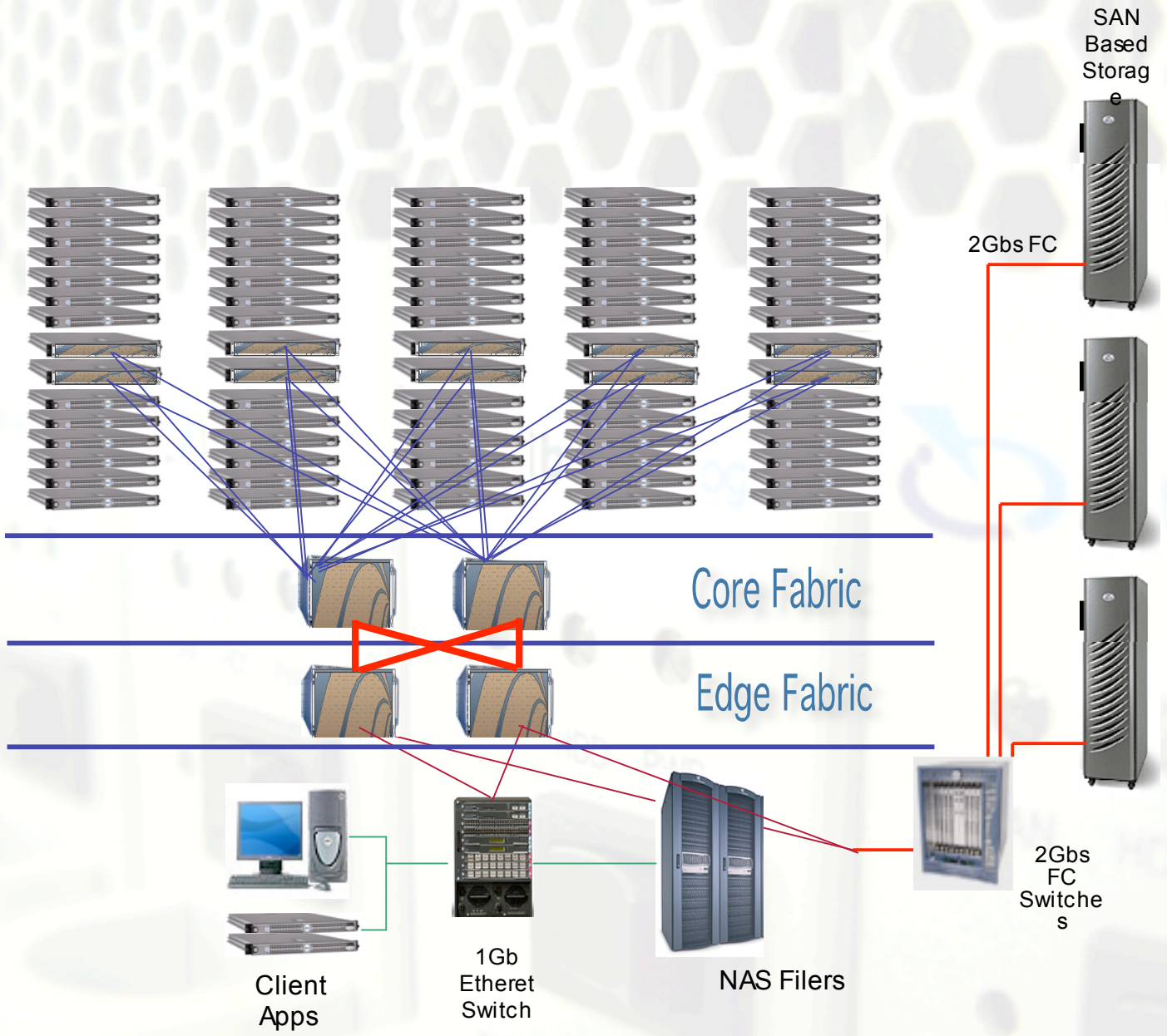


Building a Manageable 1U Infrastructure

- 1U Servers Require Fully Non-Blocking E-Net and F/C to All Nodes

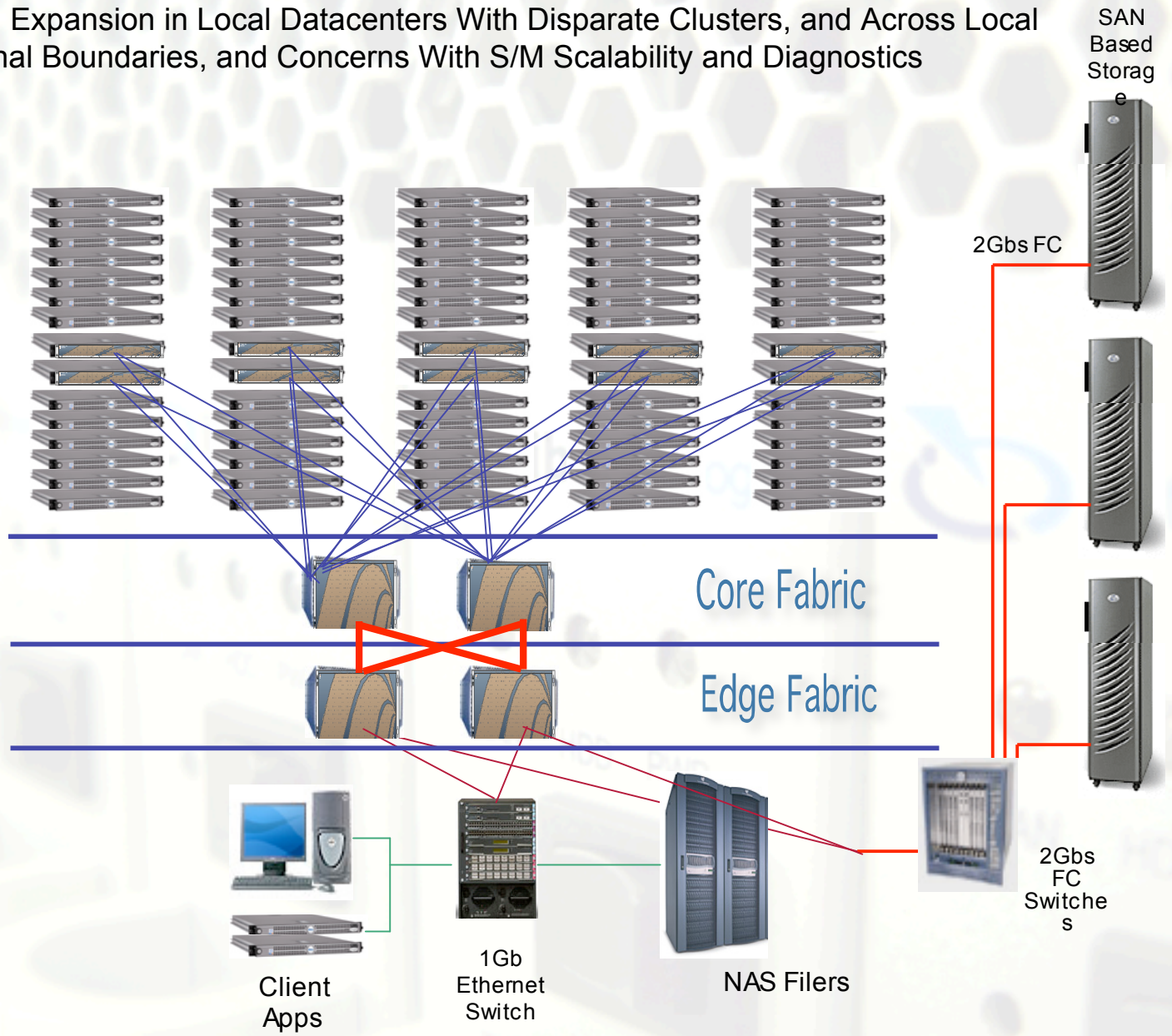


Multi-Lane Fabric Allows for More Manageable Infrastructure



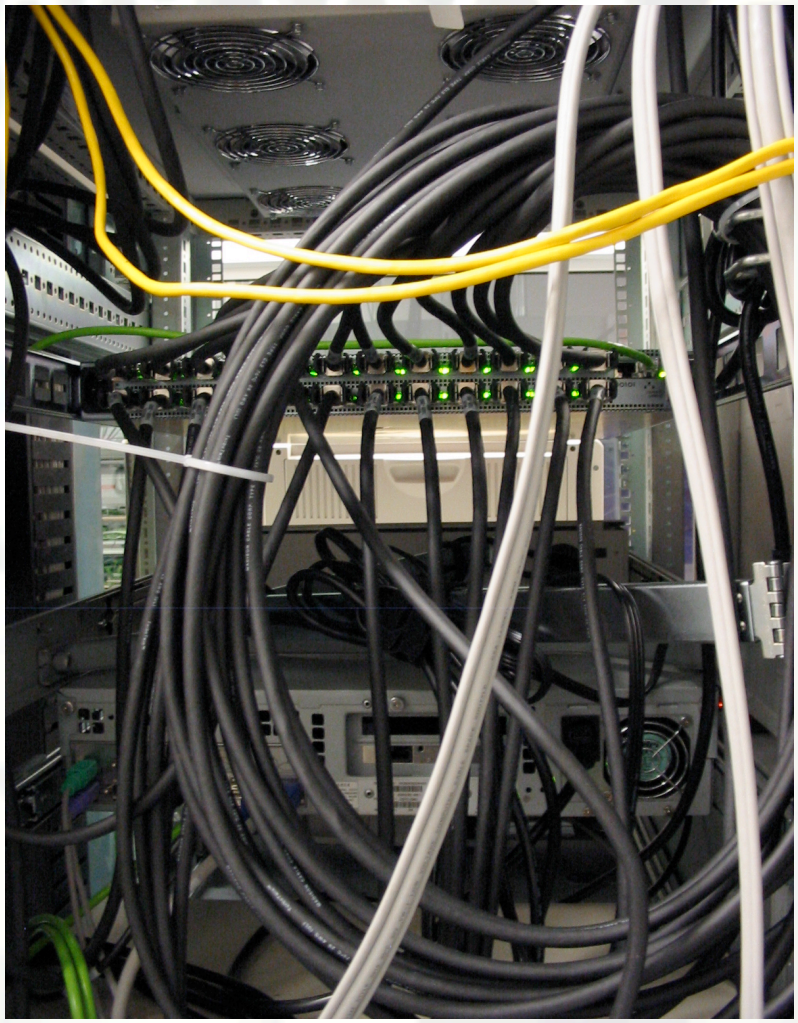
Scalability is Still Limited For “Scale Out”

- Issues with Expansion in Local Datacenters With Disparate Clusters, and Across Local and Regional Boundaries, and Concerns With S/M Scalability and Diagnostics



CHALLENGE: Datacenter Standardization

- Fully Blocking Schemes and 80 Gauge Cables Pose Significant Challenges

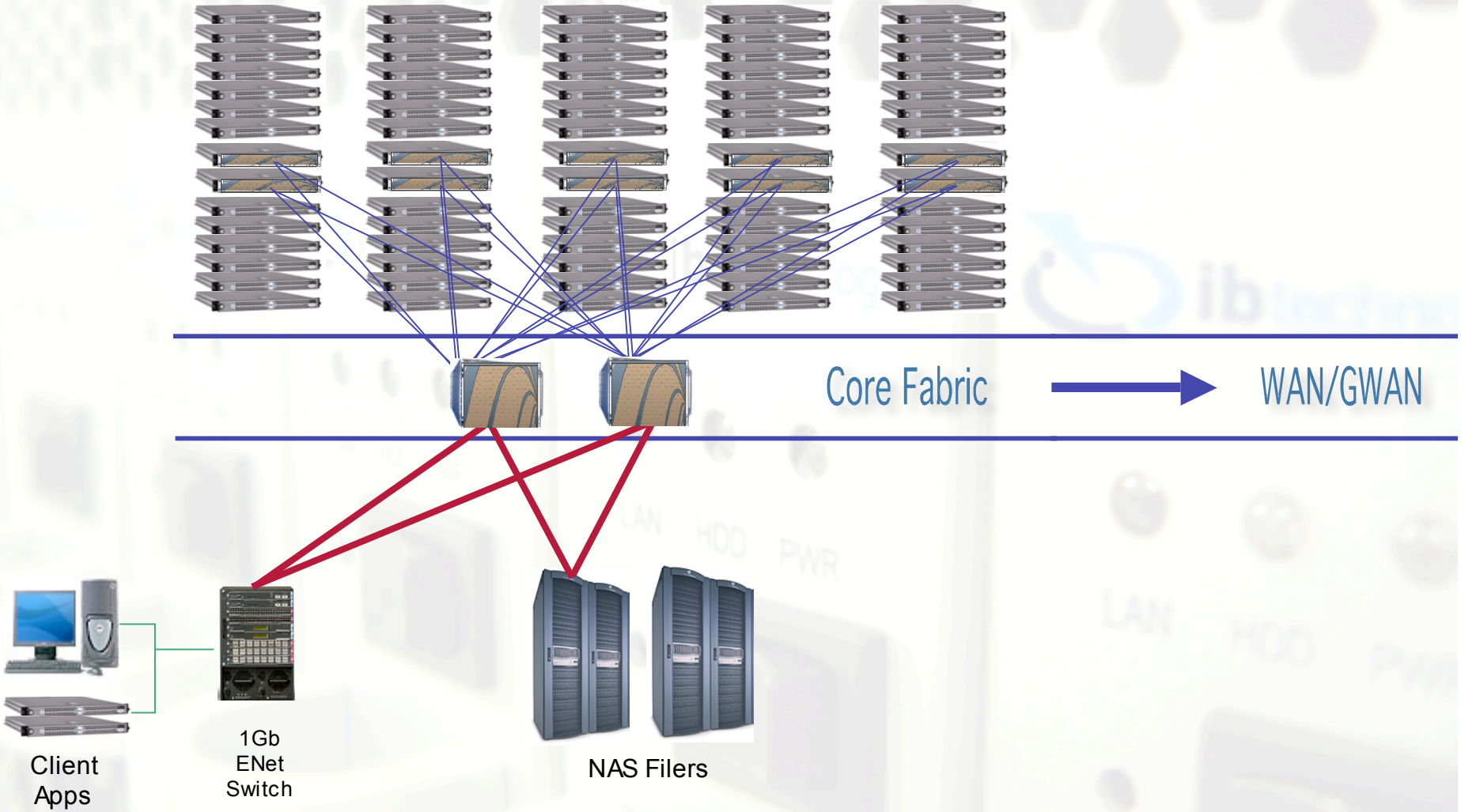


CHALLENGE: Datacenter Standardization

- Tier2 Clever Cable Management & 30 Gauge Cables Provide Short-Term Solution

CHALLENGE: Eliminate Gateways

- Nirvana Is Direct Connectivity to Storage and Distant Clusters
  ….. and Connect Directly to Storage, Client Apps, And Long Haul InfiniBand



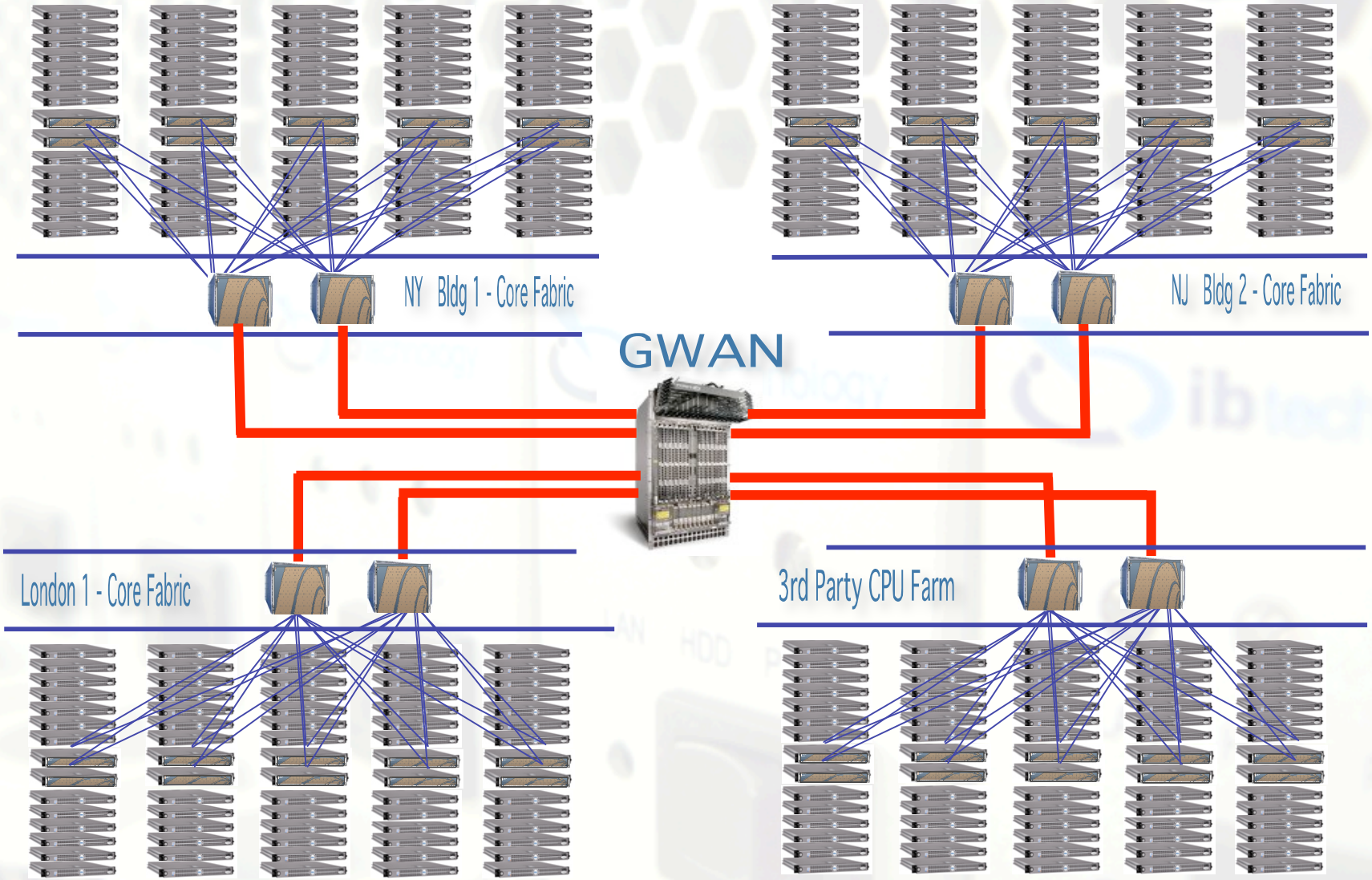
CHALLENGE: Heat, Power and Space

- At 18 to 23 KW/Rack You Could Generate Enough Heat …..

To Roast a Pig!

CHALLENGE: Heat, Power and Space

- … and building geographically disperse fabrics is becoming key.



CHALLENGE: Cost

- 10GbE Is Still Cost Prohibitive as a Server Fabric
  - Average Switch Port Cost $5,000 to $7,500 per Port.
  - Average NIC Costs $2,000 to $8,000 per Card
  - Current Cabling Standards Are Optical or Require CAT6/7 Re-Wiring
  - Price Parity with InfiniBand Not Expected Until 2007 Timeframe
  - Port Counts Remain Too Low (48 – 64 Ports/Switch)
- Software Standards Are Still Not Defined
  - RDMA Stacks Come From Multiple Vendors
  - Non-Standard TOE Engines Required
  - Creates Very Complicated Software Integration Environment
- We Can't Wait Around Anymore

Vendor Opportunities

- Value Proposition Targeted at the Enterprise
  - Need Global Distribution Capability With Short Lead Times
  - 24x7 Support Capabilities
  - IB Routing (No Gateways)
- Drive Towards Standardization – No Excuses
  - Need Realtime System Health Monitoring and Better Diagnostics
  - OpenIB MUST Become a Reality
  - Long Haul IB
  - Standard Datacenter Practices
- Wall Street Community is Now Uniting
  - 1st InfiniBand Roundtable Scheduled in Sept '05
  - The good news … you got our attention
  - The bad news ... ***you got our attention!!***

Contact Details

Ty Panagoplos
JPMorgan
212-622-1321
ty.panagoplos@jpmorgan.com

Peter Krey
JPMorgan
212-622-2926
peter.j.krey@jpmorgan.com